

**IN THE ABSTRACT**

Embodiments of the invention include a method for making optical fiber having reduced aging or hydrogen aging loss over the life of the fiber and optical fiber systems including such optical fibers. The method includes the steps of dehydrating an optical fiber glass core rod in a first environment including oxygen and at least one of chlorine-containing gases, fluorine-containing gases and carbon monoxide; and adjusting the oxygen stoichiometry of the first environment so that it is neither oxygen-rich nor oxygen-deficient. Improved silicon-oxygen stoichiometry during one or more preform manufacturing steps reduces the amount of Si defects generated in the optical fiber preform. Also, deuterium exposure of optical fiber drawn from the preform reduces the likelihood of having atomic defects such as Si defects in the optical fiber that, over time, attract and bond with hydrogen atoms to form molecules that contribute to increased water absorption loss. The inventive method produces optical fibers with improved transmission characteristics, e.g., optical fibers made by methods according to embodiments of the invention have transmission loss at 1385 nanometers that is less than 0.33 dB/km and the aging loss increase thereafter is less than 0.04 dB/km.